ABSTRACT

An improved method and apparatus for the detection of hydrogenated materials. Detection of concealed hydrogenated materials such as organic explosives, drugs, or biological tissue is accomplished by measuring the backscattering of neutrons from hydrogenous material in the targeted environment. The system comprises a neutron source that provides information as to the time at which the neutron is emitted, and a neutron sensor, which provides information as to the time at which the neutron is detected and may provide information as to the location at which the neutron is detected. The invention comprises a timing circuit that deactivates the neutron sensor during a time delay to reject signals from neutrons that have not scattered from hydrogen nuclei. The invention may further cease to detect neutrons after a window to reject signals from neutrons that have scattered off distant hydrogen nuclei, which may represent background noise. The device, therefore, preferentially detects thermalized neutrons with resulting enhanced sensitivity. The invention allows for rapid and effective detection of hydrogenated materials that may be hidden from view in the ground, in buildings, vehicles, baggage, or other structures.